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Statistical Projection of Solar Cycle 24 for the Exposure Estimates

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A solar cycle statistical model has been developed based on the accumulating cycle sunspot data to estimate future levels of the solar cycle activity. Since the current solar cycle 24 has progressed about three years, the cycle activity levels are estimated with an accurately defined solar minimum 24. Then, solar cycle 24 is projected with the cycle activity levels using the statistical model. The projection of solar cycle 24 is then coupled to space related quantities of interest to radiation protection, because the interplanetary plasma and radiation fields are modulated by the degree of disturbance in the solar surface and the radiation doses received by astronauts in interplanetary space are likewise influenced. The resultant projection of solar cycle 24 provides a basis for estimating exposure in future space missions, and projection errors can be corrected as the cycle progresses and observations become available because this model is shown to be self-correcting.